Distracted Driving from use of Electronic Communication or Other Electronic Devices 2016-2020 Data

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Introduction

The purpose of this report is to document the findings of a study that was launched in an experiment to determine if a set of Machine Learning weighting factors could be effectively generated for two Distracted Driving (DD) categories: Code 2, Distracted by Use of a Communication Device, and Code 3, Distracted Other Electronic Device. These two categories will generally be considered together and referenced as DDED, Distracted Driving by means of an Electronic Device. These devices will be referenced as eDevices.

This study served three purposes:

- 1. To determine an initial set of weighting factors that might be of use in subsequent Machine Learning exercised;
- 2. To generate, as a byproduct, those attribute values that are over-represented in DDED crashes, and thus to provide insight into DDED crash countermeasures; and
- 3. To provide an estimate of the number and the actual crashes that could be inferred to have been miss-coded leading to the possibility of correcting under-reporting of DDED crashes.

The first two of these purposes will be accomplished simultaneously, since the weighting factors will be determined by over-representations in several independent variables (or attributes) that have been found to have significant over-representations. These attributes will be presented in the next section, beginning with C010, the Rural/Urban indicator. That section will further present a rationale for these over-representations based on the 2016-2020 data. The Odds Ratios taken from identical IMPACT analyses will be used as the initial weighting factors for the machine learning process. However, only one year, 2019, was used in these analyses since a five-year database would be impossible to handle with Excel.

These findings are augmented in the next section with a review and update of a previous study of DD that was performed using 2012-2016, which is on SafeHomeAlabama.gov here: http://www.safehomealabama.gov/wp-content/uploads/2018/12/Distracted-Driving-2012-6-Data-v06.pdf

All of these conclusions were checked and those still valid are included as originally stated. Those that have changed are updated to provide the most recent findings.

The section after that, entitled Inference to Correct Under-Reporting, presents the technical details involve in transforming the data as processed above into a form that will support generating these inferences. Finally, the IMPACT analyses themselves for the 2016-2020 time frame are given in the final section.

Summary of Findings from Over-Representations in Recent Analysis

This section points out the over-representations that were found by the IMPACT analyses, and it provides some rationale for these findings. All of the findings listed were over-represented as determined by a statistically significant Odds Ratio. For this reason, they were chosen as good seeds for weighting factors for an initial machine learning iteration.

C020 Distracted Driving – Test and Control Subsets

This presents the values for DD that were contained within the test and control subsets that the IMPACTs are comparing for other relevant attributes. It is presented first to provide an overall perspective on the IMPACT comparisons that were made. The only DD attributes that were of concern in this study were those within what we defined as DDED above (distractions from phones or other electronic devices). Generally, these are considered to be the most significant of the distractions as evidenced by laws that have been passed in many jurisdictions. We consider them separate from all others because the countermeasures devised for them have little effect on the other DD attributes. The findings will now be presented in terms of the crash attributes.

C010 Rural or Urban

DDED were over-represented in rural areas by a significant Odds Ratio of 1.285 above that expected when compared to all other crashes during the five year period from 2016-2020. We reason that people are more inclined to (1) use their eDevices and (2) not pay as much attention to the roadway in areas where the traffic is not as dense. Other factors below tend to confirm this finding, which indicates that selective enforcement for DD should not be limited to urban areas.

C023 Manner of Crash

Three values of Manner of Crash were significantly over-represented in the DDED analysis (Odds Ratio, Max Gain):

- Rear End Front to Rear (1.506, 2414.3) it is reasonable to see that drivers who are distracted will have the tendency to run into others who are stopped (e.g., at a stop sign, a traffic signal, or any other reason).
- Single Vehicle Crash All Types (1.203, 532.5) distracted drivers frequently run of the road and lose control, hitting whatever object is in their way.
- Head-On Front to Front (1.228, 64.7) straying into the opposite lane would also be common, leading to crashes that have the highest severity of any Manner of Crash.

C025 Crash Severity

The crash severity for DDEDs was not significantly different from non-DD crashes in the fatal category. However, it was over-represented in all of the other injury severity categories, with

Suspected Minor Injury and Possible Injury both being statistically significant in their over-representations. The conclusion to be drawn is that crashes caused by DD are generally more severe than crashes in general. This occurs because the driver is not in a favorable position to take evasive action to lessen the severity. The cause of the crash is generally the cause of the increased severity, even though DDED crashes are not over-represented at higher speeds.

C121 CU Driver Condition

Three driver conditions were found to be significantly over-represented (Odds Ratio, Max Gain):

- Apparently Normal (1.128, 1387.9) while this is probably not seen by many as being a causal factor, it may reveal the tendency of those without any negative condition to go ahead and use the eDevice. It correlates with slightly over 90% of the DDED crashes.
- Under the Influence of Alcohol/Drugs (1.467, 195.1) on the other hand, it appears that those who have been indulging in intoxicants are also over-represented, perhaps due to their losing their best judgment impulses. We conclude that while other factors may make drivers apprehensive to use eDevices, apparently the use of intoxicants is not want of them.
- Emotional, Depresses/Angry/Disturbed (2.151, 47.1) when such a person is on the phone, the judgment needed to drive safely is consumed by their attention to their conversation. This was the most highly over-represented factor in terms of the Odds Ratio. Fortunately, it only involved a limited number of drivers.

C129 CU Vehicle Maneuver

Movement essentially straight might be compared to no Apparently Normal above in that there could be a reluctance to use an eDevice when other maneuver conditions are present. However, most roadways do not remain straight for more than a few minutes before a curve must be negotiated. So these two in combination account for over 82% of the DDED crashes.

C204 CU Sequence of Events #1

We saw above, with Manner of Crash, that 3,161 of these crashes were single vehicle (over the 2016-2020-time period). This attribute confirms that number with the collective sum of Ran-Off-Road and Crossed Centerline.

C225 CU Vehicle Damage

Major and Disabled was the only value found to be over-represented in this attribute, indicating that DDED crashes tend to have higher severities, which is consistent with our conclusions for severity given above. Again, the reason for this is probably the inability of the distracted driver to take actions to mitigate the crash (e.g., slamming on the brakes).

C227 CU Vehicle Towed

Vehicle towed because of its being disabled is significantly over-represented, consistent with the findings immediately above.

C230 CU Areas Damaged

The three over-represented areas damaged will be useful for providing evidence that other crashes not indicated to be DDED were in fact likely to have been in this category. The areas of Head-On-Center (area 12), Totaled (area 16) and Right-Front Angle (area 1) will provide indicators that the crash was likely to have been caused by DDED.

C233 CU Point of Initial Impact

Consistent with the above is the significant over-representation in Head-On-Center point of initial impact. While it is difficult to see how "Top" could be the initial point of impact, this does indicate that the vehicle rolled over and it would correlate highly with the vehicle being totaled.

C403 CU Roadway Condition

It has been well established that wet conditions lead to fewer fatal crashes, and this has typically been believed to be due to the reduction in speed in these situations. However, the reluctance to use an electronic device could also be a major factor in fatality reduction in wet weather conditions. There was a 71.8% reduction in the proportion of crashes as a result of wet weather.

C412 CU Trafficway Lanes

While it would seem that the fewer lanes on two-lane highways would have a deterrent effect on the use of cell phones, the inability for the distracted driver (or others) to recover from erratic driving seems to overcome this, resulting Two-Lane roads being the only ones with a significant over-representation. Another factor might be the absence of a shoulder or a clear roadside to allow for recovery on rural (e.g., County) roads.

Summary of Findings from Over-Representations in the Previous Analysis

This section reviews the over-representations that were found by the previous IMPACT analyses that were based on 2012-2016 data. These were in-depth analyses and we felt it was better the update and summarize them in this report so that this information is available. Those cases where there was a change indicated by the 2016-2020 data will be noted and the reason will be provided as best it can be determined from recent studies. Otherwise, "No change" will be noted. The ordering of the results will be as they appear in the original study.

C025 Crash Severity. No change, see above. – generally DDED crashes are more severe than non-DDED crashes.

C129 CU Vehicle Maneuver. No change, see above – crashes were shown to be down in obvious un-safe situations, and up where the driver feels comfortable using the phone or other electronic device.

C224 CU Estimated Speed at Impact. Drivers who use DDED devices do not seem to visualize speed as being as hazardous as curves or other roadway issues. This is especially true in the 71-85 MPH range, which we suspect would be caused by speeding on Interstate highways.

C122 CU Driver Officer Opinion Alcohol (Compare with C121 above in the previous section). No change. It was confirmed that DDED drivers were more likely to be under the influence of either alcohol or drugs (C123).

C121 CU Driver Condition (in this case Emotionally Distressed). No change, see above. The Odds Ratio for the past study was over twice (2.7), and it was about the same in the current study (2.2), showing that many emotionally distressed individuals have no aversion to using the phone while driving.

C104 CU Left Scene. In both studies the DDED drivers had significantly fewer cases where they left the scene. Perhaps they were too busy describing the crash to the person they had on the phone.

C030 Weather. No change, see C403 Roadway Condition above. DDED occurs significantly more in clear weather than it does in rainy weather.

C107 Driver Age. Recent studies confirmed that the most likely over-represented drivers are those 17-20, and above the age of about 43, the over-representation becomes under-representation, and the older the driver is (above 43) the more under-represented.

C109 Driver Gender. Male drivers have become much more over-represented than found in the previous study. The previous Odds Ratio was 1.022; it now is closer to 1.156. Both are significant, and the second is clearly significantly higher than the previous number, which indicates the trend of a greater proportion of male drivers engaging in DDED.

C110 CU Driver Residence Distance. Little change. The large majority (76%) are Less than 25 Miles from home, which probably reflects the overall traffic mix.

C001 County. No change. Counties with the largest cities tended to be at the bottom of the list with fewer than expected DDED crashes.

C002 Rural or Urban. No change. The rural areas are over-represented, which further supports the County conclusion given above.

C033 Locale. Little change. The largest number who put their DDEDs aside are in the Shopping or Business districts. The highest recent over-representations are in Open Country, Residential and School areas (ordered by highest MaxGain first). School areas were not significant in the earlier study.

C011 Highway Classification. No change. In order of worst first (by MaxGain), County, State, and Federal. Interstate and Municipal roadways tend to have the lowest proportions of crashes.

C008 Time of Day. No change. Rush hours and all night-time (dark) hours are over-represented. These are times and conditions when DDED is particularly hazardous.

C006 Day of the Week. No change. Sunday is the most over-represented (significant), and Saturday is slightly over-represented (not significantly). An analysis of time of day by day of the week shows a very strong correlation with DUI (alcohol and/or drugs).

C023 Manner of Crash. No Change – see above. The three most over-represented are Rear End, Single Vehicle and Head-On (front to front).

C017 First Harmful Event. No change. About 25% of DDED crashes are single vehicle.

C052 Number of Vehicles. Slight change. Significantly over-represented are single vehicle (25%), 3 vehicles (7%) and 4 vehicles (1%). Two-vehicle crashes are no longer significantly over-represented, but they account for 67% of all DDED crashes.

C208 CU Model Year. Change of necessity. Recent over-representations have been in the 2010 to 2014 model years.

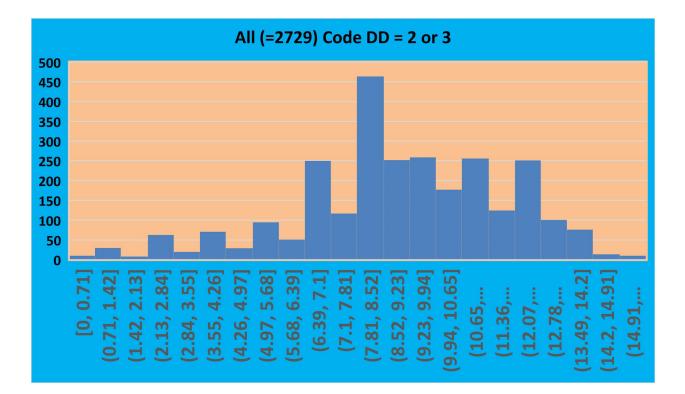
C101 Causal Unit Type. Major Change in pickups. Pickups, that were significantly under-represented, moved up to third place in over-representation, behind Passenger Cars (54%), and Sport Utility Vehicles (23%). Pickups had 18% of the DDED crashes.

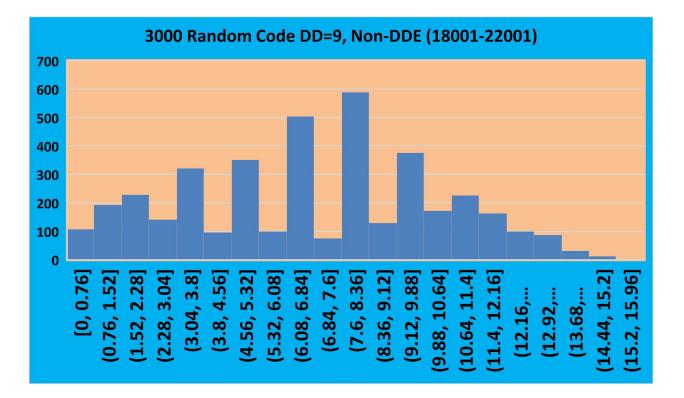
Inferences to Correct Under-Reporting

This study was set in motion by an attempt to find weighting factors to be used in subsequent machine learning with regard to DDED. It is the opinion of most traffic safety professionals that the reporting of all DD is lower than reality because of difficulty officers have in validating that DD has taken place.

The process used in creating the first step weighting factors was as follows:

- 1. The IMPACTs summarized above and detailed below were performed in order to determine the attribute values that were over-represented in the DDED cases. Note that the IMPACTS below were run for the entire most recent five-year period (2016-2020), while the Odds Ratios used for the initial weights were obtained from the same analyses but limited to one year, 2019.
- 2. A DataGen was performed on all of the 2019 data for the attributes given above. The calendar year 2019 was chosen since it appeared to contain typical and timely results. The integer option for DataGen was chosen so that the integer that relates to the specific code was captured as opposed to the value label descriptors. This greatly facilitated the substitution of the weighting factors.
- 3. The Odds Ratios seemed to be proportional to the over-representation for each of the attribute values that were over-represented. Since each of these was represented by a unique integer within its respective attribute, it was fairly simple to substitute the Odds Ratio that represented the degree of over-representation for the integer that was created by DataGen. We are referring to these numbers as "weighting factors" since their values are generally proportional to the over-representations that they represent.
- 4. In order to get an indication of how any given crash corresponded to a DDED case, the weighting factors were summed across the attributes for each of the crashes. This resulted in a total indicator for each crash. The higher this sum of weighting factors for a crash, the higher the crash was correlated to the over-represented DDED attributes. An example of these weighting factors for a number of crashes can be seen within the Excel sheet that will accompany this report.
- 5. The two charts below compare these totals as indicated:
 - The first chart is for DDED crashes, depicting all 2,729 DDED crashes (2 = Distracted by Use of Electronic Communication; and 3 = Distracted by the Use of Another Electronic Device).
 - The second chart is for Non-DD crashes of any type, i.e., those coded as 9 (No Distractions) by the recording officer. A sample of 3000 cases was selected at random from the total of 83,580 such (Code 9) cases in order to make the two charts comparable in number.
- 6. The differences between the two charts is obvious. They both have modes between 7.5 and 8.5. However, the DDED (first) chart clearly has more cases above the mode than does the random sample, and the opposite is true of the Code 9 chart.





It is possible to infer that some of the cases that were coded as 9 (Not Distracted Driving) might have been coded as a 2 or 3 if the officer had more complete information. This can be done by recognizing that the crashes with the highest combined (total) weighting factors are those that are most likely to be DDED. This is because the DDED attributes had the highest over-representations in those factors most correlated to DDED.

The attached Excel spreadsheet page presents the results of a sort on the sum of the weighting factors with the highest at the top. Each line is a crash. The totals for each crash ranged from 0 to 16.109. Those retained in this spreadsheet are only those with totals above 15.000. This is a small part of the sort of all 150,269 cases for 2019 (all crashes)

Of interest here are those crashes for which the DD attribute was marked to be 9 (Not Applicable – Not Distracted). The following is a high-level explanation for the columns in this spreadsheet:

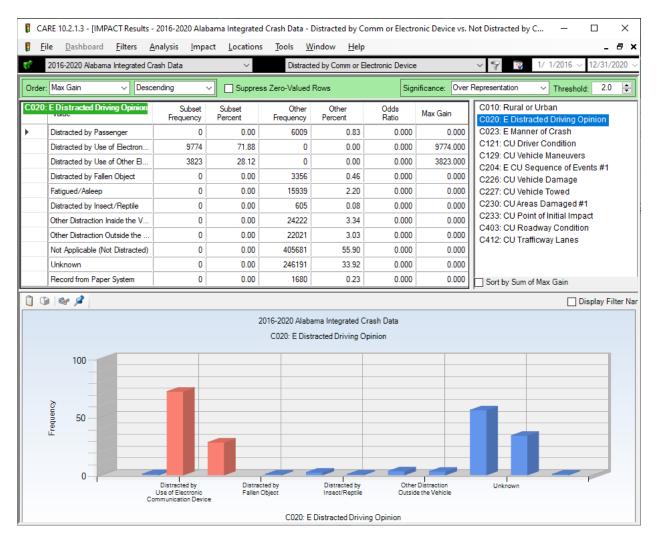
- A the crash identifier number (not used in this study).
- B Value assigned to C020 (Distracted Driving). Potential values are to the right of the listing. All DD crashes (i.e., B column = 2 or 3 were removed prior to sorting.
- C-N Integer value of each respective attribute replaced by its Odd's Ratio = weighting factor. C-N corresponds to Rural/Urban, Manner of Crash, etc. as given below and in Findings.
- N&O the sum of all of the weights for the crash; N and O are identical columns.

Thus, what we have is the actual code for DD that was assigned to these crashes. These may include DD codes other than 2 or 3. The interpretation of each is given to the right of the listing. The 9 values are of most interest because they are the ones that the reporting officer marked as not being any type of DD.

The 9's are marked with a yellow background, and 85 of them were found in this group of 129 crashes that had the highest sum of weighting factors (all 15 or greater). While this might seem like a large number having the highest correlations with DDED crashes that we so marked, it amounts to only 3.11% of those for which a 2 or 3 was assigned. We believe that this is a fairly conservative number of false negatives in that none of the lower-summed crashes were even considered. While some of the 9's in the 15+ category might well not be false negatives, for sure some of those in the 15- category would also be suspect. We feel that confining the estimate to just those crashes that exhibited all of the DDED over-representations is a good compromise that accounts for all possibilities.

IMPACT Displays

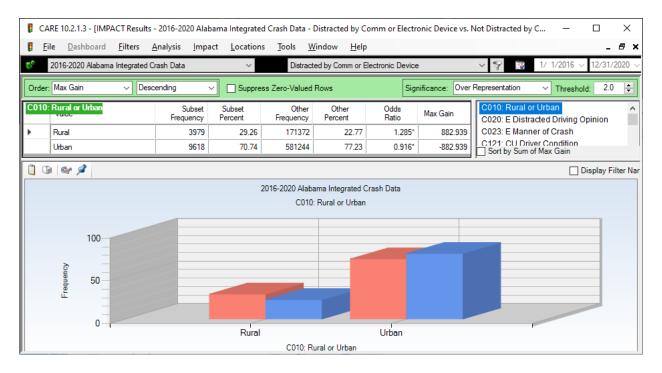
C020 Distracted Driving – Test (called Subset) and Control Subset (called Other)



This chart is for all crashes in 2016-2020. It is given to demonstrate the data on DDED over this five-year period. It is important to realize that the IMPACTs that were summarized in the spreadsheets and used for (1) the Summary of Findings and (2) the Inference Regarding Under Reporting were obtained strictly from the 2019 calendar year.

All of the IMPACT analyses below were from the 2016-2020 data. It was felt that these five years of data would provide more accurate results than just one year.

C010 Rural or Urban



C023 Manner of Crash

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🚦 Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u>	analysis <u>I</u> mpa	act <u>L</u> ocations	<u>T</u> ools <u>W</u>	<u>/</u> indow <u>H</u> elp			_ 8 >
6	2016-2020 Alabama Integrated Cr	rash Data	\sim	Distract	ed by Comm or E	lectronic Device		✓ ♥ 1/ 1/2016 ∨ 12/31/2020 ∨
Order:	Max Gain 🗸 Desci	ending	Suppres	s Zero-Valued	Rows	Sigr	ificance: Over	Representation V Threshold: 2.0
C023:	E Manner of Crash	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 📼	C010: Rural or Urban C020: E Distracted Driving Opinion
<u>۲</u>	Rear End (front to rear)	7188	52.86	264233	35.11	1.506*	2414.283	C023: E Manner of Crash
	Single Vehicle Crash (all types)	3161	23.25	145490	19.33	1.203*	532.531	C121: CU Driver Condition C129: CU Vehicle Maneuvers
	Head-On (front to front only)	348	2.56	15682	2.08	1.228*	64.684	C204: E CU Sequence of Events #1
	Sideswipe - Opposite Direction	249	1.83	13665	1.82	1.009	2.124	C226: CU Vehicle Damage
	Record from Paper System	0	0.00	1680	0.22	0.000	0.000	C227: CU Vehicle Towed
	Non-Collision	38	0.28	5242	0.70	0.401*	-56.704	C230: CU Areas Damaged #1
	Causal Veh Backing: Rearto	12	0.09	4611	0.61	0.144	-71.304	C233: CU Point of Initial Impact C403: CU Roadway Condition
	Unknown	11	0.08	5338	0.71	0.114	-85.438	C412: CU Trafficway Lanes
	Angle Oncoming (frontal)	218	1.60	18000	2.39	0.670*	-107.194	
	Angle (front to side) Opposite	216	1.59	22080	2.93	0.541*	-182.904	
	Angle (front to side) Same Dir	184	1.35	20377	2.71	0.500*	-184.137	
	Causal Veh Backing: Rearto	41	0.30	13946	1.85	0.163*	-210.953	
	Other	131	0.96	18981	2.52	0.382*	-211.917	
	Side Impact (90 degrees)	746	5.49	68366	9.08	0.604*	-489.122	
	Sideswipe - Same Direction	571	4.20	69691	9.26	0.454*	-688.060	
	Side Impact (angled)	483	3.55	65234	8.67	0.410*	-695.538	Sort by Sum of Max Gain
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			2		ama Integrated C			
				C023: E	Manner of Cras	h		
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		Re	cord from Paper			to side) Opposi	te Direction	Sideswipe - Same Direction
				C	023: E Manner of	Crash		

C025 Crash Severity

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E E	ile <u>D</u> ashboard <u>F</u> ilters <u>4</u> 2016-2020 Alabama Integrated C		act <u>L</u> ocations		(indow <u>H</u> elp ed by Comm or E		;	~ 🗣 🔞	1/ 1/2016 🗸	_ ₽ ×
Order	: Natural Order V Desc	ending	Suppres	ss Zero-Valued	Rows	Sigr	nificance: Over	Representation	✓ Threshold:	2.0 🚖
C025	: Crash Severity	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C025: Crash	Severity	
•	Fatal Injury	69	0.51	4348	0.58	0.878	-9.552			
	Suspected Serious Injury	455	3.35	23945	3.18	1.052	22.402			
	Suspected Minor Injury	1497	11.01	57766	7.68	1.434*	453.381			
	Possible Injury	1459	10.73	69860	9.28	1.156*	196.887			
	Property Damage Only	9876	72.63	576431	76.59	0.948*	-537.986			
	Unknown	241	1.77	20266	2.69	0.658*	-125.132	Sort by Sum	of Max Gain	
	2016-2020 Alaba	ma Integrated Cra	ash Data - Filter :		Comm or Electro Crash Severity		Not Distracted by	Comm or Electror		play Filter Nar
	100 čouranbau									
	0	T Fatal Injury	Suspected Serious Injury	Suspecte Minor Inju		T ble Injury	Property Damage Only	Unknown	-	

C121 CU Driver Condition

CARE	E 10.2.1	.3 - [IMPA	CT Re	sults - 2(016-2020) Alabar	na Integ	grated Crash	Data - Distract	ted by Comn	n or Electroni	ic Device vs. N	lot Distracted b	y C — I	- >
<u>F</u> ile	<u>D</u> as	hboard	<u>F</u> ilter	s <u>A</u> na	alysis	<u>I</u> mpact	Loc	ations <u>T</u> oo	ls <u>W</u> indow	<u>H</u> elp					- 8
20)16-202	0 Alabama	Integra	ated Cras	h Data			~	Distracted by C	omm or Electro	onic Device		~ 9 😨	1/ 1/2016 ~ 1	2/31/2020
Order: N	Max Gair	n	~	Descen	ding	~	🗌 Si	uppress Zero-	Valued Rows		Signific	cance: Over F	Representation	✓ Threshold:	2.0
C121: C	U Driv	er Conditi	on				Subset uency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C010: Rural C020: E Dist	or Urban acted Driving Opii	nion
► A	pparent	tly Normal					12205	90.16	598042	79.91	1.128*	1387.924	C023: E Man	ner of Crash	
E	Under	the Influen	ce of A	Ncohol/D	rugs		613	4.53	23106	3.09	1.467*	195.071		iver Condition	
E	Emotio	nal (Depre	ssed/A	ngry/Dist	turbed)		88	0.65	2262	0.30	2.151*	47.086		hicle Maneuvers Sequence of Event	to #1
P	Appare	ently Asleep	o *				0	0.00	15	0.00	0.000	0.000		hicle Damage	15 # 1
P	Patigue	ed*					0	0.00	7	0.00	0.000	0.000	C227: CU Ve	-	
E	Physic	al Impairme	ent				30	0.22	1907	0.25	0.870	-4.493		as Damaged #1	
0	ther						12	0.09	1494	0.20	0.444	-15.023		int of Initial Impac	t
c	CU is No	t a Vehicle					18	0.13	2170	0.29	0.459	-21.250		adway Condition afficway Lanes	
	Iness						12	0.09	2930	0.39	0.226	-40.996	0412.00 m	anoway Lanco	
E	Asleep	/Fainted/F	atigued	d			46	0.34	11886	1.59	0.214*	-168.988			
С	:U is Un	known					88	0.65	28759	3.84	0.169*	-432.178			
U	Jnknowi	n					425	3.14	75840	10.13	0.310*	-946.755	Sort by Sum	of Max Gain	
									20 Alabama Inte C121: CU Drive	-	ı Data				play Filter
L	Frequency	50		1											
		- 1			E Under the Influence of Alcohol/Drugs			P Apparently Asleep" –	E Hrysical Impairment –	Driver Conditi	s CUis Not a Vehicle—		c. Assessment and cavinaligued -	Unknown	

C129 CU Vehicle Maneuver

	2016-2020 Alabama Inte	egrated Crash Da	ta	\sim	Distracted	by Comm or Elec	tronic Device		✓ ♥ 1/ 1/2016 ∨ 12/31/202
rder:	Max Gain	Descending	~	Suppress Z	ero-Valued Ro	ws	Signif	icance: Over l	Representation V Threshold: 2.0
129:	CU Vehicle Maneuve	rs	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C010: Rural or Urban C020: E Distracted Driving Opinion
	Movement Essentially	Straight	10457	76.95	379324	50.54	1.523*	3589.173	C023: E Manner of Crash
	E Negotiating a Curve		793	5.84	34118	4.55	1.284*	175.279	C121: CU Driver Condition
	E Stopped for Sign/Sig	nal	64	0.47	2886	0.38	1.225	11.748	C129: CU Vehicle Maneuvers C204: E CU Sequence of Events #1
	Stopped in Traffic		56	0.41	2723	0.36	1.136	6.699	C226: CU Vehicle Damage
	Legally Parked		2	0.01	542	0.07	0.204	-7.813	C227: CU Vehicle Towed
	Illegally Parked		9	0.07	1045	0.14	0.476	-9.920	C230: CU Areas Damaged #1
	E Leaving Main Road		37	0.27	2639	0.35	0.774	-10.780	C233: CU Point of Initial Impact
	CU is Not a Vehicle		18	0.13	2170	0.29	0.458	-21.289	C403: CU Roadway Condition C412: CU Trafficway Lanes
	Making U-Tum		46	0.34	4184	0.56	0.607*	-29.753	
	Other		52	0.38	6902	0.92	0.416*	-72.964	
	Slowing/Stopping		688	5.06	42694	5.69	0.890*	-84.994	
	E Overtaking/Passing		41	0.30	8360	1.11	0.271*	-110.361	
	Unknown		18	0.13	13477	1.80	0.074	-226.007	
	E Entering Main Road		85	0.63	19181	2.56	0.245*	-262.280	
	Turning Right		253	1.86	37763	5.03	0.370*	-430.716	
	CU is Unknown		88	0.65	28759	3.83	0.169*	-432.694	
	Backing		129	0.95	34758	4.63	0.205*	-500.309	
	E Changing Lanes		247	1.82	43316	5.77	0.315*	-537.255	
	Turning Left		506	3.72	85521	11.39	0.327*	-1042.395	Sort by Sum of Max Gain
0) 🕼 🖉								Display Filte
				2016	-2020 Alabama	a Integrated Cra	sh Data		
					C129: CU Ve	hicle Maneuver	s		
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C204 CU Sequence of Events #1

CA	RE 10.2.1.3 - [IMPACT Results	- 2016-2020 Ala	bama Integrate	ed Crash Data	- Distracted by	Comm or Ele	ectronic Device	e vs. Not Distracted by C — 🗆 🗙
B Ei	ile <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis <u>I</u> mp	act <u>L</u> ocatio	ns <u>T</u> ools	<u>W</u> indow <u>H</u> e	lp		- 8
\$	2016-2020 Alabama Integrated (Crash Data	~	Distra	acted by Comm o	r Electronic De	vice	✓ ♥ 1/1/2016 ∨ 12/31/2020
Order	Max Gain V Des	cending	Suppro	ess Zero-Value	ed Rows	:	Significance:	Over Representation V Threshold: 2.0
C204:	ECU Sequence of Events #1	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C010: Rural or Urban C020: E Distracted Driving Opinion
•	Ran Off Road Right	1829	13.45	52323	6.95	1.935*	883.716	
	Crossed Centerline	537	3.95	17428	2.32	1.706*	222.140	
	Ran Off Road Left	714	5.25	28801	3.83	1.372*	193.672	C129: CU Vehicle Maneuvers C204: E CU Sequence of Events #1
	Evasive Action (Swerve/Bra	742	5.46	38339	5.09	1.071	49.355	
	Ran Off Road Straight	125	0.92	4476	0.59	1.546*	44.135	C227: CU Vehicle Towed
	Collision with Mailbox	33	0.24	1088	0.14	1.679*	13.344	
	Collision with Utility Pole	52	0.38	2177	0.29	1.322	12.670	C233: CU Point of Initial Impact
	Collision with Sign Post	25	0.18	1097	0.15	1.261	5.181	C403: CU Roadway Condition C412: CU Trafficway Lanes
	Collision with Ditch	43	0.32	2120	0.28	1.123	4.699	
	Collision with Non-Motorist:	16	0.12	639	0.08	1.386	4.456	
	Collision with Light Pole (No	11	0.08	413	0.05	1.474	3.539	
	Collision with Culvert Headwall	7	0.05	230	0.03	1.685	2.845	-
	Collision with Guardrail End	9	0.07	353	0.05	1.411	2.623	-
	Crossed Median	23	0.17	1133	0.15	1.124	2.531	-
	Collision with Bridge Support	3	0.02	80	0.01	2.076	1.555	-
	Collision with Work Zone/M	7	0.05	309	0.04	1.254	1.418	-
	Collision with Curb/Island/R	48	0.35	2596	0.34	1.023	1.100	-
	Collision with Light Pole (Bre	7	0.05	342	0.05	1.133	0.821	-
	Collision with Impact Attenua	1	0.01	14	0.00	3.954	0.747	✓ Sort by Sum of Max Gain
] [) @ <i>9</i>							Display Filter
				2016-2020 Ala	abama Integrated	l Crash Data		
				C204: E C	U Sequence of E	vents #1		
	80							
	60							1
	è –							
	ASUBAL 40							
L								
	20							
	0		Collision	with Cable B	Barrier		Non-Con	tact Vehicle
)4: E CU Sequer	ce of Events #		

C225 CU Vehicle Damage

🖡 CA	RE 10.2.1.3 - [MPACT Resu	ılts - 2016-20	020 Alab	ama Integrate	d Crash Data -	Distracted by C	omm or Electr	onic Device vs. I	Not Distracted by	с —		×
Ei Ei	le <u>D</u> ashboa	rd <u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpa	ct <u>L</u> ocation	s <u>T</u> ools <u>V</u>	<u>V</u> indow <u>H</u> elp)				-	₽×
6 2	2016-2020 Ala	oama Integrate	ed Crash Data	9	~	Distrac	ted by Comm or I	Electronic Device)	~ 💡 🏆	1/ 1/2016 $\scriptstyle{\smallsetminus}$	12/31/2	2020 ~
Order:	Max Gain	~ [)escending	`	Suppres	ss Zero-Valued	Rows	Sig	nificance: Over	Representation	✓ Threshold	2.0	-
C226:	CU Vehicle [)amage		Subset uency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 🔻	C010: Rural of C020: E Distra	r Urban Icted Driving Op	inion	^
•	Major and Dis	abled		6686	49.17	253831	33.73	1.458*	2099.934	C023: E Mann			
	CU is Not a V	ehicle		18	0.13	2170	0.29	0.459	-21.206	C121: CU Driv	er Condition icle Maneuvers		
	Major Not Dis	abled		1454	10.69	82053	10.90	0.981	-28.484		equence of Ever	nts #1	
	Not Applicable	,		10	0.07	2487	0.33	0.223	-34.934	C226: CU Veh		10 // 1	
	None Visible			543	3.99	37448	4.98	0.803*	-133.588	C227: CU Veh	icle Towed		
	CU is Unknow	'n		88	0.65	28759	3.82	0.169*	-431.600		as Damaged #1		
	E Minor			4606	33.88	295048	39.21	0.864*	-724.750		nt of Initial Impa Idway Condition		
	Unknown			192	1.41	50775	6.75	0.209*	-725.372	Sort by Sum o		1	
0) 😪 🖉										Dis	splay Fil	lter Nar
					1	2016-2020 Alab	ama Integrated (Crash Data					
						C226: 0	CU Vehicle Dama	ige					
	60												
	40												
	Frequency												
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	0		Major and Disabled	CU is I a Vehi			pplicable None	Visible CU is	Unknown El	Minor Unkno	own		
						C22	6: CU Vehicle D	amage					

C227 CU Vehicle Towed

-				Alabama Integrate				ronic Device vs. N	Not Distracted by C	- 0	×
1 1		ashboard <u>F</u> ilt 020 Alabama Integ		npact <u>L</u> ocation		<u>/</u> indow <u>H</u> elp ted by Comm or E		e	✓ ♥ 1/ 1/ 1	- 1/2016 ~ 12/31/	
Orde	er: Max G	iain ~	Descending	Suppre	ess Zero-Valued	Rows	Sig	nificance: Over	Representation ~	Threshold: 2.0	•
C22	7: CUVe	ehicle Towed	Subs Frequenc		Other Frequency	Other Percent	Odds Ratio	Max Gain 🔻	C010: Rural or Urba C020: E Distracted		^
•	E Vehi	icle Towed - Disab	oling 67	4 49.38	253541	33.69	1.466*	2133.448	C023: E Manner of		
	CU is I	Not a Vehicle		8 0.13	2197	0.29	0.453	-21.692	C121: CU Driver Co		
	E Vehi	icle Towed - Other	r Rea 40	3.45	28636	3.80	0.907	-48.347	C129: CU Vehicle M C204: E CU Seque		
	Unkno	wn	:	0.24	6869	0.91	0.258*	-92.098	C226: CU Vehicle D		
	Not Ap	oplicable	1!	52 1.12	15290	2.03	0.550*	-124.234	C227: CU Vehicle T	-	
	CU is	Unknown	8	8 0.65	28732	3.82	0.170*	-431.081	C230: CU Areas Da		
	Vehicl	e Not Towed	612	4 45.04	416553	55.35	0.814*	-1401.579	Sort by Sum of Max	Gain	
)) ((((((((((((((((((<i>\$</i>			2016-2020 Alab	ama Integrated C CU Vehicle Towe				Display F	ilter Na
	Frequency	60 40 20	P			U venicie rowe					
		0	E Vehicle Towed - Disabling Damage		E Vehicle Towed Other Reasong C22	Unknown 7: CU Vehicle To	Not Applicabl	le CU is Unknow	wn Vehicle Not Towed		

C230 CU Areas Damaged

🚦 CA	RE 10.2.1.3 - [IMPACT Results -	2016-2020 Alaba	ama Integrated	Crash Data - [Distracted by Co	omm or Electro	onic Device vs. N	Not Distracted by C	×
Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u>	analysis <u>I</u> mpac	ct <u>L</u> ocations	<u>T</u> ools <u>W</u>	indow <u>H</u> elp				_ @ ×
6 2	2016-2020 Alabama Integrated C	rash Data	~	Distract	ed by Comm or Ele	ectronic Device		✓ ♀ 1/ 1/2016 ∨ 12/	31/2020 、
Order	: Max Gain 🗸 Desc	ending ~	Suppres	s Zero-Valued	Rows	Sign	ificance: Over F	Representation V Threshold:	2.0 😫
C230:	CU Areas Damaged #1	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 📼	C010: Rural or Urban C020: E Distracted Driving Opinio	
•	Area 12 - Head On Center	5363	39.44	231726	30.79	1.281*	1176.564	C023: E Manner of Crash	
	Area 16 - Totaled	1888	13.89	60300	8.01	1.733*	798.601	C121: CU Driver Condition	
	Area 1 - Right Front Angle	3749	27.57	178979	23.78	1.159*	515.508	C129: CU Vehicle Maneuvers C204: E CU Sequence of Events	#1
	Area 13 - Top	9	0.07	952	0.13	0.523	-8.199	C226: CU Vehicle Damage	<i>π</i> Ι
	Area 14 - Undercarriage	28	0.21	2516	0.33	0.616*	-17.455	C227: CU Vehicle Towed	
	CU is Not a Vehicle	18	0.13	2170	0.29	0.459	-21.204	C230: CU Areas Damaged #1	
	Area 9 - Broadside Left	141	1.04	9729	1.29	0.802*	-34.767	C233: CU Point of Initial Impact C403: CU Roadway Condition	
	E Area 10	272	2.00	19020	2.53	0.792*	-71.621	C412: CU Trafficway Lanes	
	Area 3 - Broadside Right	77	0.57	8754	1.16	0.487*	-81.153		
	E Area 8	121	0.89	12305	1.63	0.544*	-101.306		
	Area 15 - Attachment	25	0.18	7876	1.05	0.176*	-117.290		
	E Area 4	80	0.59	11973	1.59	0.370*	-136.308		
	E Area 2	133	0.98	14953	1.99	0.492*	-137.146		
<u> </u>	Area 11 - Left Front Angle	741	5.45	49208	6.54	0.834*	-148.007		
	Area 7 - Left Rear Angle	248	1.82	22510	2.99	0.610*	-158.673		
	Area 5 - Right Rear Angle	95 304	0.70	15592 36425	2.07	0.337*	-186.690		
	Not Applicable CU is Unknown	304	0.65	28759	3.82	0.462	-354.066		
	Area 6 - Rear End Center	217	1.60	38611	5.13	0.165	-431.565		
		217	1.00	30011	5.15	0.511	400.000	Sort by Sum of Max Gain	
) @ <i>\$</i>							Displa	y Filter Na
			2	016-2020 Alaba	ima Integrated Ci	rash Data			
				C230: CU	Areas Damaged	#1			
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	0								
	- T	Area 14 -	Undercarriage		E Area 8		Area 7 - Lef	t Rear Angle	
				C230): CU Areas Dam	naged #1			
I									

C233 CU Point of Initial Impact

🖡 CA	RE 10.2.1.3 - [IMF	ACT Results	- 2016-2020 Alab	ama Integrated	Crash Data - [Distracted by Co	mm or Electro	onic Device vs. N	Not Distracted by	, c − □ ×
Ei	le <u>D</u> ashboard	<u>F</u> ilters	<u>Analysis</u> Impa	ct <u>L</u> ocations	<u>T</u> ools <u>W</u>	indow <u>H</u> elp				_ 8
¢°	2016-2020 Alabam	a Integrated	Crash Data	~	Distract	ed by Comm or Ele	ectronic Device		~ 💡 🏆	1/ 1/2016 ~ 12/31/2020
Order:	Max Gain	~ Des	cending ~	Suppres	s Zero-Valued	Rows	Sign	ificance: Over	Representation	V Threshold: 2.0
C233:	CU Point of Initia	al Impact	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 📼	C010: Rural o	r Urban acted Driving Opinion
•	Area 12 - Head O	n Center	10183	74.89	405101	53.83	1.391*	2864.317	C023: E Mann	
	Area 13 - Top		57	0.42	2478	0.33	1.273	12.232	C121: CU Dri	
	Area 14 - Underca	amage	99	0.73	5548	0.74	0.988	-1.232		hicle Maneuvers Sequence of Events #1
	CU is Not a Vehic	le	18	0.13	2170	0.29	0.459	-21.204	C226: CU Ver	
	Area 9 - Broadside	e Left	130	0.96	11092	1.47	0.649*	-70.392	C227: CU Veh	nicle Towed
	E Area 10		197	1.45	15082	2.00	0.723*	-75.476		as Damaged #1
	E Area 8		87	0.64	10046	1.33	0.479*	-94.494		int of Initial Impact adway Condition
	Area 15 - Attachm	ient	33	0.24	8136	1.08	0.225*	-113.988		fficway Lanes
	E Area 4		105	0.77	12419	1.65	0.468*	-119.366		
	Area 3 - Broadside	e Right	138	1.01	14385	1.91	0.531*	-121.884		
	Not Applicable		60	0.44	10128	1.35	0.328*	-122.976		
	E Area 2		154	1.13	15560	2.07	0.548*	-127.112		
	Area 7 - Left Rear	^r Angle	79	0.58	12219	1.62	0.358*	-141.752		
	Area 11 - Left From	nt Angle	848	6.24	56002	7.44	0.838*	-163.750		
	Area 5 - Right Rei	ar Angle	95	0.70	14330	1.90	0.367*	-163.890		
	Area 1 - Right Fro	nt Angle	889	6.54	58624	7.79	0.839*	-170.120		
	CU is Unknown		88	0.65	28759	3.82	0.169*	-431.569		
	Unknown		137	1.01	33267	4.42	0.228*	-464.012		
	Area 6 - Rear End	l Center	200	1.47	37194	4.94	0.298*	-471.959	Sort by Sum	of Max Gain
0) 🕸 🖉									Display Filter
	201	16-2020 Alaba	ama Integrated Cras	sh Data - Filter =		Comm or Electron Point of Initial Imp		lot Distracted by	Comm or Electror	nic Device
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	0									
			Area 9 - E	Broadside Left	Are	a 3 - Broadside	Right	Area 5 - Righ	nt Rear Angle	
					C233	CU Point of Initi	al Impact			

C403 CU Roadway Condition

-		-			bama Integrated		Distracted by C /indow Help		onic Device vs. N	Not Distracted by	c –		×
ы С		20 Alabama Int			√		ed by Comm or E		•	~ 💡 🔞	1/ 1/2016 \sim	12/31/	
Order	: Max Gai	in	√ Desce	ending	Suppres	ss Zero-Valued	Rows	Sigr	nificance: Over	Representation	✓ Threshold	I: 2.0	÷
C403:	CU Roa	idway Conditi	ion	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 📼	C010: Rural o C020: E Distra	r Urban acted Driving Or	pinion	
•	Dry			11693	86.00	564906	75.06	1.146*	1487.229	C023: E Mann	er of Crash		
	Muddy S	Sand/Dirt/Grav	vel	7	0.05	367	0.05	1.056	0.370	C121: CU Driv			
	E Slush			1	0.01	169	0.02	0.328	-2.053		icle Maneuvers		
	E Water	Buildup		2	0.01	676	0.09	0.164	-10.213	C204: E CU S C226: CU Veh	equence of Eve icle Damage	n(s #1	
	Unknow	'n		2	0.01	885	0.12	0.125	-13.989	C227: CU Veh	-		
	Ice			3	0.02	2067	0.27	0.080	-34.343		as Damaged #*	1	
	Not App	licable		134	0.99	25836	3.43	0.287*	-332.761		nt of Initial Impa		
	CU is Ur	hknown		88	0.65	28759	3.82	0.169*	-431.569		idway Conditio	n	
	Wet			1667	12.26	128428	17.06	0.718*	-653.221	C412: CU Trat	-		
		2016-20)20 Alaban	na Integrated Cra	ash Data - Filter :		Comm or Electro Roadway Condi		Not Distracted by	Comm or Electron	ic Device		
	Frequency	100 50 0											
			20	Muddy Sand/Dirt/Gravel	E Slush	E Water Buildup	Unknown	8	Not Applicable	C U is Unknown			
						C403:	CU Roadway C	ondition					

C412 CU Trafficway Lanes

8 (CARE 1	0.2.1.3 - [IMP/	ACT Results	- 2016-2020 Alab	ama Integrated	d Crash Data - I	Distracted by Co	omm or Electro	onic Device vs. N	lot Distracted by C	- 0	×
١	<u>F</u> ile	<u>D</u> ashboard	<u>F</u> ilters <u>/</u>	<u>A</u> nalysis <u>I</u> mpa	ct <u>L</u> ocations	s <u>T</u> ools <u>W</u>	<u>(</u> indow <u>H</u> elp					- 8 ×
¢?	2016	-2020 Alabama	a Integrated C	ìrash Data	~	Distract	ed by Comm or E	ectronic Device	•	✓ ♥ 1/ 1	/2016 ~ 12/3	31/2020 、
Orde	er: Max	Gain	✓ Desc	ending 🔻	Suppres	ss Zero-Valued	Rows	Sigr	nificance: Over F	Representation ~	Threshold:	2.0 🜲
C41	2: CU	Trafficway La	nes	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 📼	C010: Rural or Urba C020: E Distracted		n
▶	Two	Lanes		7072	52.01	324629	43.13	1.206*	1207.149	C023: E Manner of (
	Fou	r Lanes		3934	28.93	213070	28.31	1.022	84.610	C121: CU Driver Co C129: CU Vehicle M		
	One	Lane		229	1.68	16099	2.14	0.787*	-61.850	C204: E CU Sequer		¥1
	Thre	ee Lanes		598	4.40	36944	4.91	0.896*	-69.442	C226: CU Vehicle D		
	Five	Lanes		413	3.04	27420	3.64	0.834*	-82.378	C227: CU Vehicle To		
	Six	Lanes or More		1094	8.05	75273	10.00	0.804*	-265.906	C230: CU Areas Da	-	
	Not	Applicable (Pa	rking Lot)	169	1.24	30422	4.04	0.307*	-380.614	C233: CU Point of Ir C403: CU Roadway		
	CU	is Unknown		88	0.65	28759	3.82	0.169*	-431.569	C412: CU Trafficwa		
										Sort by Sum of Max	Gain	
			6-2020 Alaba	ma Integrated Cra	sh Data - Filter :	= Distracted by (Comm or Electro	nic Device vs. 1	Not Distracted by	Comm or Electronic Dev	<mark>⊡ Displa</mark> ice	y Filter Na
		60	_			C412: CI	J Trafficway Lan	es				
	Frequency	40										
	Fre	20										
		0										
		0 1	Two L	anes Four La	anes One L	ane Three	Lanes Five		Lanes Not Ap More (Park	pplicable CU is Unknown ing Lot)	P	
						C412	CU Trafficway	Lanes				